


4.1 extreme values of functions

extrema
max, min

- absolute (global)
biggest or smallest on the entire graph
- local
biggest or smallest on a given neighborhood



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use the right vocabulary

max $(=)$ $y=1$

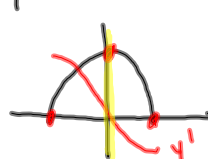
max at $x=0$
(when)

extreme pts (x,y)
extreme value y

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$y = \cos x$

$-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$



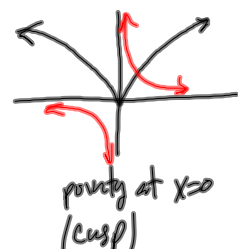
abs max at $x=0$
abs max is $y=1$
abs min at $x=-\frac{\pi}{2}, \frac{\pi}{2}$
abs min is $y=0$

what does the derivative tell us?
when $y' = 0$, $y = \cos x$ has a max

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$y = x^{2/3}$

abs min at $x=0$
abs min is $y=0$
no max



pointy at $x=0$
(cusp)

$y' = \frac{2}{3} x^{-1/3}$
 $y' = \frac{2}{3} \cdot \frac{1}{\sqrt[3]{x}}$
 $y'(0) = \infty$

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candidates for extrema:

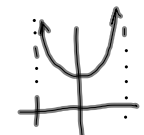
- critical points
where $f' = 0$
or where $f' = \infty$
- endpoints

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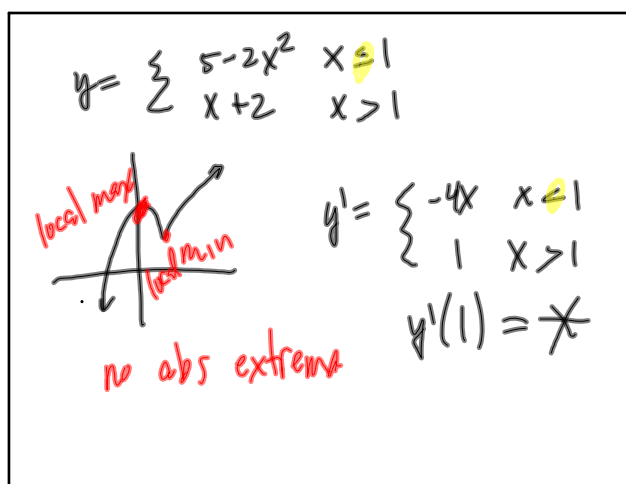
$y = \frac{1}{\sqrt{4x^2}}$ domain $-2 < x < 2$
range $.5 \leq y < \infty$

min is $y=.5$
min at $x=0$

$y' = -2x(\frac{1}{2})(4x^2)^{-3/2}$
 $= \frac{x}{\sqrt{(4x^2)^3}}$
 $y'(0) = 0$
 $y'(2) = \infty$



Oct 19-2:02 PM



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